Working Group on California Earthquake Probabilities
(WGCEP)

Development of a

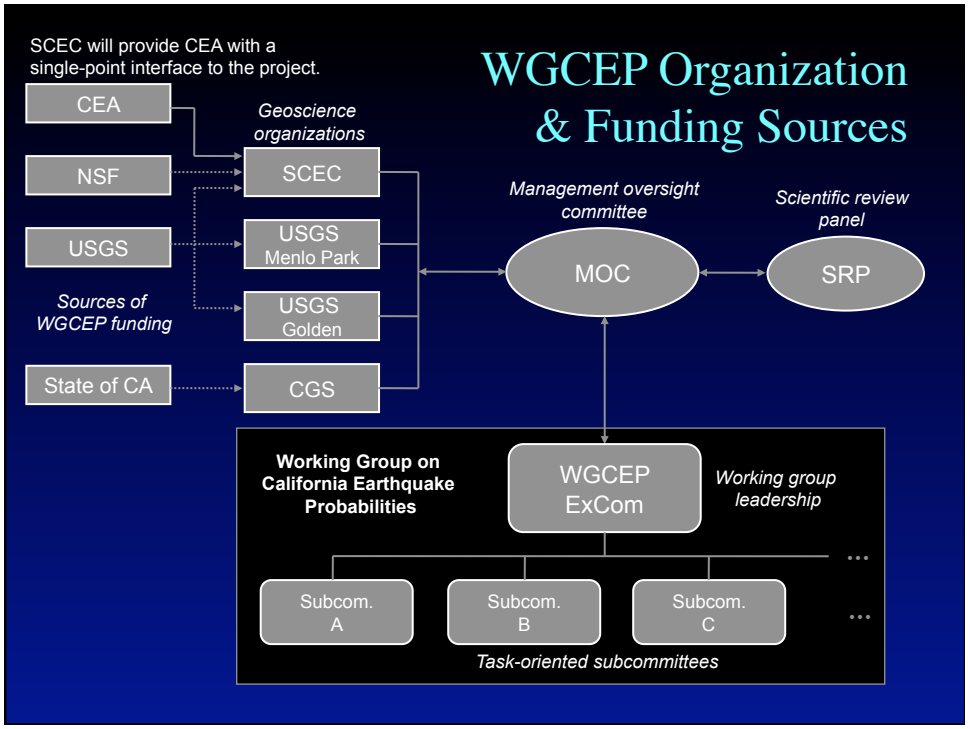
Uniform California Earthquake Rupture Forecast
(UCERF)

WGCEP Goals:

To provide the California Earthquake Authority (CEA) with a statewide, time-dependent ERF that uses "best available science" and is endorsed by the USGS, CGS, and SCEC, and is evaluated by Scientific Review Panel (SRP) and CEPEC

Coordinated with the next National Seismic Hazard Mapping Program (NSHMP) time-independent model

CEA will use this to set earthquake insurance rates (they want 5-year forecasts, maybe 1-year in future)



WGCEP Management:

WGCEP Management Oversight Committee (MOC):

• SCEC	**Thomas H. Jordan (CEA contact)**
• USGS, Menlo Park	Rufus Catchings
• USGS, Golden	Jill McCarthy
• CGS	Michael Reichle

In charge of resource allocation and approving all project plans, budgets, and schedules

Their signoff will constitute the SCEC/USGS/CGS endorsement

WGCEP Executive Committee:

- **Edward (Ned) Field**; SCEC/USGS, Pasadena
- Thomas Parsons, USGS, Menlo Park
- Chris Wills, CGS
- Ray Weldon, SCEC/UofO
- Mark Petersen, USGS, Golden
- Ross Stein, USGS, Menlo Park

Responsible for convening experts, reviewing options, making decisions, and orchestrating implementation of the model and supporting databases

Key Scientists:

Provide expert opinion and/or specific model elements - likely receiving funding & documenting their contributions.

Role of leadership is not to advocate models, but to accommodate whatever models are appropriate

Contributors

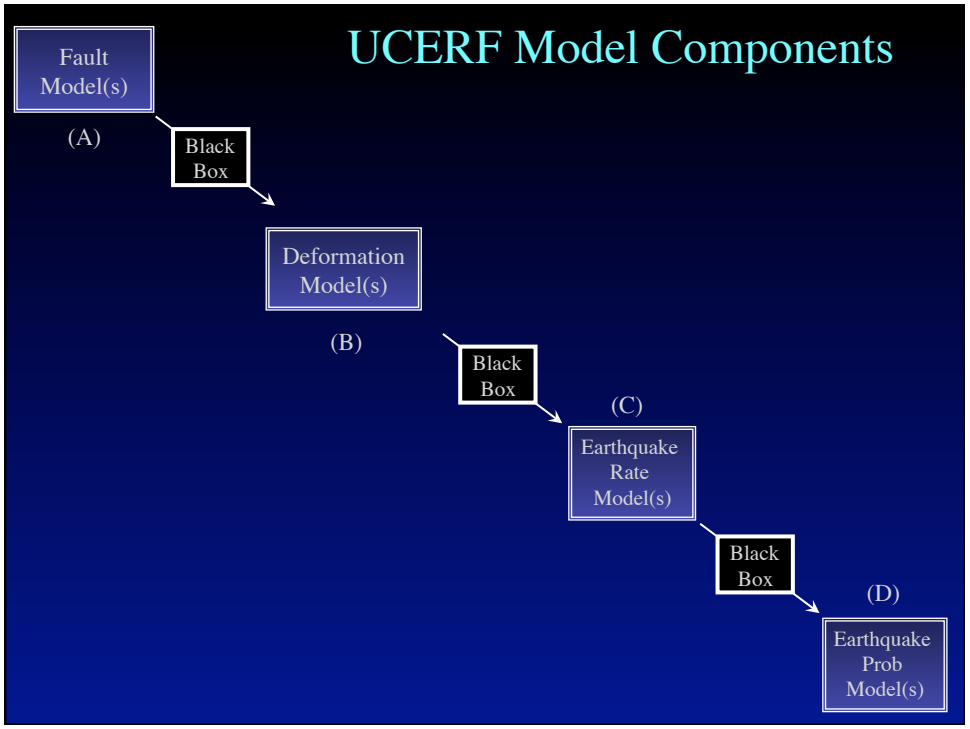
Scientific Review Panel:

Bill Ellsworth (chair)
Art Frankel
David Jackson
Jim Dieterich
Lloyd Cluff
Allin Cornell
Mike Blanpied
David Schwartz

This group will ultimately decide whether we've chosen a minimum set of alternative models that adequately spans the range of viable 5-year forecasts for California

CEPEC:

Lucile Jones
Tom Jordan
Jim Brune
William Lettis
John Parrish
Duncan Agnew
Mike Reichle
David Openheimer
Paul Segall



Delivery Schedule

February 8, 2006 (to CEA)

UCERF 1.0 &

S. SAF Assessment to CEA

Aug 31, 2006 (to CEA)

Fault Section Database 2.0

Earthquake Rate Model 2.0 (preliminary for NSHMP)

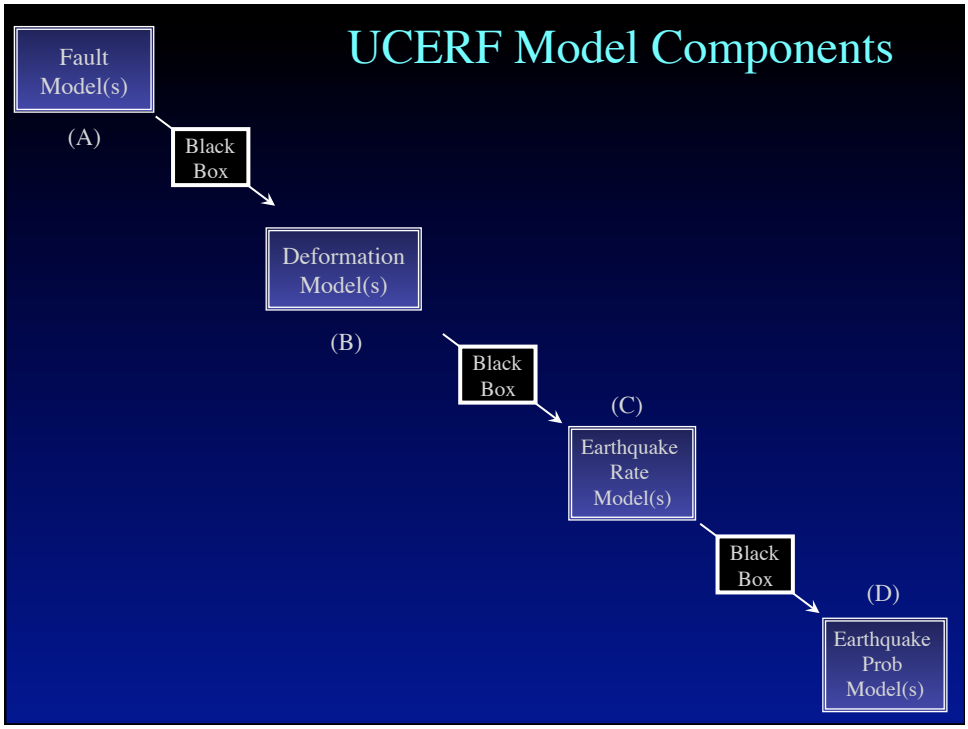
April 1, 2007 (to NSHMP)

Final, reviewed Earthquake Rate Model
(for use in 2007 NSHMP revision)

September 30, 2007 (to CEA)

UCERF 2.0 (reviewed by SRP and CEPEC)

UCERFs ≥3 later



Issues/Possible Innovations

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1) Statewide model
2) Use of CFM (including alternatives)
3) Use GPS data via kinematically consistent deformation model(s)
4) Relax strict segmentation assumptions
5) Allow fault-to-fault jumps
6) Apply elastic-rebound-motivated renewal models in (4) & (5)
7) Include earthquake triggering effects
8) Deploy as extensible, adaptive (living) model
9) Simulation enabled

Decision Making Process

Two type of decisions:

1) what model components to include (logic-tree branches)
2) what weights to apply to each

Decisions will be made and a case-by-case (or branch-by-branch) basis (web site has details; www.WGCEP.org).

Decision Making Process

In general:

1. The ExCom hosts meetings/workshops to solicit expert opinion.
2. The ExCom, with perhaps assistance from others, drafts proposed branches and preliminary weights with full documentation and posts these on the web.
3. Email feedback is requested from the broader community and responses are entered into an official record.
4. The ExCom revises and documents accordingly.
5. The SRP reviews the entire process and iterates with the ExCom if need be (MOC serves as referee).

Decision Making Process

This entire decision making process will be well documented for posterity.

We will also strive to establish a quantitative basis for setting weights, both for numerical reproducibility and future modifications.

However, it may be that "gut feeling" will in some cases be the best or only way to assimilate a large number of constraints.

Validation & Verification

Verification will be conducted via standard practice in software development (e.g., JUnit Testing for our Java Classes).

Validation via participation in RELM/CSEP testing efforts (although these won't be definitive anytime).

Test the assumptions that go into the models.

Examine simulated catalogs.

Both validation and verification will be addressed on a case-by-case basis; we will have explicit sections dedicated to each in the formal documentation of all model components.

More Info?

UCERF 1 vs UCERF 2

UCERF 2 Logic Tree

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UCERF 1 vs 2

- Updated/revised fault models, slip rates and aseismic-slip-factor estimates
- Revision of rupture models for type-A faults based on new information, and to achieve more statewide consistency with respect to the range of segmented vs cascade vs floating-rupture models.
- Reexamination of type B-faults and their magnitude-frequency distributions
- Reconsideration of how historical seismicity is smoothed to generate the distribution of background events
- Apply the range of time dependent probability models considered by WGCEP-2002 on a consistent, statewide basis (making adjustments/ improvements where necessary)